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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,695	12/31/2003	Albert A. Vierheilig	113222.146 US1	2181

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EXAMINER

SINGH, PREM C

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 10/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/749,695	Applicant(s) VIERHEILIG ET AL.	
	Examiner Prem C. Singh	Art Unit 1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-136 is/are pending in the application.
- 4a) Of the above claim(s) 93-99 and 121-136 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-92 and 100-120 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>12/31/2003</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Claims 93-99, and 121-136 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected Groups, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 08/15/2006.

Specification

The disclosure is objected to because of the following informalities:

Abstract (line 3): Please delete --"solution"--.

Appropriate correction is required.

The disclosure is objected to because the application is not updated with regards to the continuation data of prior application number 10/729,270 filed 12/05/2003.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

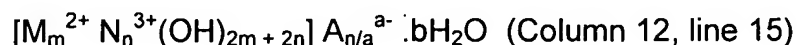
Claims 1-92 and 100-120 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vierheilig (US Patent 6,028,023).

Claim 1.

Vierheilig discloses a process for reducing sulfur in a FCC unit to refine petroleum (Column 15, lines 15-18). Vierheilig further discloses that hydrotalcite-like

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(HTL) compounds may be used as sorbents especially SO_x sorbent and hydrocarbon cracking catalyst for use in fluidized bed systems." (Column 16, lines 10-16). According to Vierheilig, HTL compounds will most preferably have a chemical structure:



"Wherein M^{2+} and N^{3+} are cations, m and n are selected such that the ratio of m/n is about 1 to about 10, a will have a value of 1, 2 or 3, A is an anion with charge of -1, -2 or -3, and b will range between 0 and 10, are highly preferred. The most preferred elements for "M" in the above structure will be Mg, Ca, Zn, Mn, Co, Ni, Sr, Ba, Fe and Cu. The most preferred element for "N" will be Al, Mn, Fe, Co, Ni, Cr, Ga, B, La and Ce. The most preferred elements for "A" with charge a^- will be CO_3^{2-} , NO_3^- , SO_4^{2-} , Cl^- and OH^- , Cr^- , I^- , SO_4^{2-} , SiO_3^{2-} , HPO_3^{2-} , MnO_4^{2-} , HGao_3^{2-} , HVO_4^{2-} , ClO_4^- and BO_3^{2-} and mixtures thereof". (Column 12, lines 16-27). The process of making HTL compounds comprises:

(a) "Preparing a reaction mixture comprising a divalent metal containing compound and a trivalent metal containing compound (Column 13, lines 16-18) forming an initial slurry or precipitation synthesis reaction" (Column 8, lines 12-14).

(b) "The reaction product may be subjected to low temperature (i.e., less than 250°C) drying process before heat treatment (Column 8, lines 35-39).

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(c) "Drying process may also include the physical formation of those powders, pellets, beads, extrudates, microspheroidal spheres or granule forms for use as catalysts, sorbents, etc." (Column 8, lines 40-45).

(d) "The heat treatment step involves heating synthesis reaction products to a temperature in the range of about 300°C to about 850°C." (Column 8, lines 49-52).

(e) "Heat treated product is then subjected to a hydration step." (Column 9, lines 49-51).

(f) "The hydrated product may again be collapsed by a second heat treatment step." (Column 10, lines 21-22).

Vierheilig further discloses in Table III (Column 20, lines 40-45) that the hydrotalcite-like (HTL) compound thus produced has XRD patterns mostly closely matching ICDD Card 35-965 (Column 20, lines 31-35).

It is to be noted that Vierheilig uses the term "heat treatment" in steps (d) and (e), the invention also uses the term "calcination" for heating beyond 300°C (Column 3, lines 13 and 43).

Vierheilig further discloses, "The HTL compounds of this invention can be formed into various shapes (particles, microspheroidal particles, extrudates, pellets)." (Column 22, lines 25-27).

Although Vierheilig does not specifically mention reducing sulfur in gasoline produced in an FCC unit, the invention does disclose the use of HTL compound in an FCC unit as a SO_x sorbent, hydrocarbon cracking catalyst, and catalyst carrier or binder material to refine petroleum. Since HTL is effective for SO_x absorption and HTL

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can also be used as a FCC catalyst, it is expected that the use of HTL as FCC catalyst will reduce sulfur in gasoline during the FCC process. Therefore, any gasoline produced in a FCC process using HTL as a component (either as a catalyst or as a SO_x sorbent), must be reduced in sulfur. Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Vierheilg invention and reduce sulfur in gasoline from the FCC unit by contacting HTL with the feedstock for a better quality gasoline.

Claims 2, 17, 32, and 46.

Vierheilg's disclosure in claim 1 includes magnesium as X and aluminum as Y.

Claims 3, 12, 18, 26, 33, 40, 47, 53, 62, 72, 78-80, and 106-108.

Vierheilg discloses in Table I the molar ratio of Mg:Al of 2/1, 3/1, and 5/1 (Column 18, lines 6-8). Vierheilg discloses, "This is evidenced by the presence of all major peaks of an HTL compound, including peaks at about 11.271 degrees.

Claims 4, 19, 34, 85, 86, 116, and 117.

Vierheilg discloses, "Any number of well known oxidants may be employed in conjunction with applicant's HTL compounds. Such oxidants would include, for example, platinum, those compounds which form oxides of the rare earth metals, oxides of transition metals etc." (Column 17, lines 56-60).

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Claims 5, 35, and 48.

Vierheilig discloses use of 15 wt% of oxidant (12% CeO₂ and 3% V₂O₅) in the HTL compound (Column 20, lines 20-22).

Claims 6, 7, 20, 21, 31, 45, 63, 73, 87, 88, and 118-120.

Vierheilig discloses, "HTL compounds may comprise at least one HTL compound made by the process of this invention and at least one, chemically different, binder, matrix, or support, say calcium aluminate." (Column 18, lines 36-42).

Claims 8-11, 22, 23, 24, 25, 36-39, 49-52, 58-61, and 68-71.

All the limitations of these claims are disclosed by Vierheilig under claim 1.

Claims 13-15, 27-29, 41-43, 54-56, 64-66, 74-76, and 90-92.

Vierheilig discloses, "Any of the HTL compounds may be used in FCC systems wherein the SO_x sorbent particle species comprises from about 10 to about 90 wt% of the overall SO_x additive system. Such an overall, SO_x additive system will, in turn, normally comprise from about 0.5 to about 10.0 wt % of a bulk hydrocarbon cracking catalyst (e.g. zeolite) SO_x additive system." (Column 16, lines 1-9).

It is to be noted that bulk hydrocarbon cracking catalyst is the inventory of the regenerator.

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Claims 16 and 44.

Claims 16 and 44 have all the limitations of claims 1 and 4, already discussed above.

Claims 30 and 57.

Claims 30 and 57 have all the limitations of claim 1 and discussed before.

Claim 67.

Claim 67 has all the limitations of claims 1, 4 and 7, and discussed before.

Claim 77.

Claim 77 has all the limitations of claim 3 with only difference of XRD pattern displaying at least a reflection at a two theta peak position at about 43 degrees and 62 degrees.

Although Vierheilg does not specifically mention about two theta peak position at about 43 degrees and 62 degrees, the invention does disclose in figures 6 and 7 XRD patterns of HTL compounds covering theta from 6 to 66 degrees. The invention discloses, " The stick diagram (vertical lines of different heights at the appropriate 2 θ position) for the best matching ICDD card is superimposed on each of these two plots. In this case the best match was with ICDD card 35-965." (Column 19, lines 51-61). Since the XRD pattern of Vierheilg invention and the claimed invention, both have patterns matching with ICDD card 35-965, Vierheilg invention must have reflection at

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two theta peak position similar to the Applicant's and therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify Vierheilig invention and claim reflection at a two theta peak position of 43 degrees and 62 degrees for proper characterization of the HTL compound.

Claims 81-83.

Claims 81-83 have the limitation of a shaped body which has already been discussed under claim 1 (c).

Claims 84 and 112.

Vierheilig discloses in Table I that the HTL compound has MgO 52.1 wt% or more (Column 18, lines 9-11).

Claim 89.

Vierheilig does not specifically mentions using zinc titanate or zinc aluminate, but the invention does disclose using calcium aluminate as a support for the HTL compound. Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Vierheilig invention and use zinc aluminate as support because calcium aluminate and zinc aluminate, both are functionally similar and it is expected that either of the supports will be effective in the sulfur removal from gasoline.

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Claims 100-104.

Claims 100-104 have all the limitations of claims 1 and 77 and have been discussed before.

Claim 105.

Vierheilig does not specifically mention about heating the HTL compound prior to contacting with the feedstock.

Vierheilig does mention the use of HTL compound as hydrocarbon cracking catalyst and as a sorbent for SO_x absorption in the FCC process. Since FCC process is carried out at elevated temperatures, it would have been obvious to one skilled in the art at the time the invention was made to modify Vierheilig invention and heat the HTL compound prior to contacting with the feedstock for effective sulfur removal in the process.

Claims 109-111.

Claims 109-111 have all the limitations of claim 1 and discussed before.

Claim 113-115.

Claims 113-115 have all the limitations of claims 1 and 77 and discussed before.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

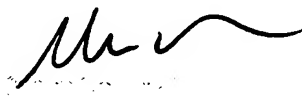
Myrstad et al, US patent 6,497,811.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Prem C. Singh whose telephone number is 571-272-6381. The examiner can normally be reached on MF 6:30 AM-3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PS /100306

A handwritten signature in black ink, appearing to be 'M. Singh', with a stylized flourish at the end.